

# Rediscovery of *Sciopetris melitensis* Rebel, 1919 and description of its morphology and life history (Psychidae)

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**Abstract.** The original description of *Sciopetris melitensis* Rebel, 1919 is based on a strongly damaged male collected in 1915 by Adolf Andres at the former Verdala Barracks, Bormla. The species was re-described by Amsel (1955) based on four badly damaged males collected at Gharghur in 1953. Since then only these specimens are known in the literature. After a lapse of over 50 years the species was rediscovered and breeding from eggs succeeded. Based on this material, males, females, eggs, larvae, pupae and bag as well as the life history are described and compared with the other species of the genus.

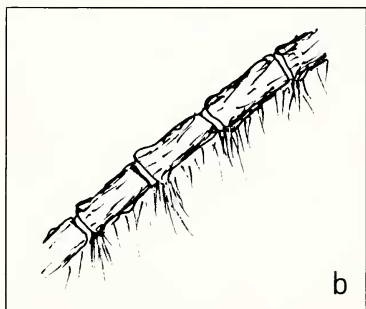
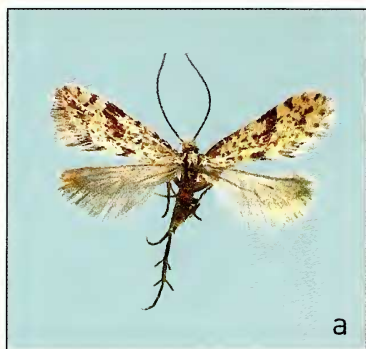
**Zusammenfassung.** Die Originalbeschreibung von *Sciopetris melitensis* Rebel, 1919 basiert auf einem stark beschädigten Männchen, das 1915 von Adolf Andres in den damaligen Verdala Barracks Bormla gefangen wurde. Die Art wurde von Amsel (1955) aufgrund von vier, in Gharghur 1953 gesammelten, sehr schlecht erhaltenen Männchen nachbeschrieben. Seit dem sind nur diese Männchen in der Literatur bekannt. Nach einer Unterbrechung von über 50 Jahren wurde die Art wieder gefunden und es gelang die Zucht aus dem Ei. Basierend auf diesem Material werden Männchen, Weibchen, Ei, Larve, Puppe und Sack sowie die Entwicklung beschrieben und mit den anderen Arten der Gattung verglichen.

**Résumé.** La description de *Sciopetris melitensis* Rebel, 1919 est basée sur un mâle fortement endommagé, capturé par Adolf Andres en 1915 à Verdala Barracks, Bormla. Amsel l'a re-décrit de quatre mâles en très mauvais état, capturés à Gharghur en 1953. Depuis, seulement ces cinq exemplaires ont été mentionnés dans la littérature. Après une interruption de plus de 50 ans l'espèce a été retrouvée et élevée à partir de l'œuf. Des informations additionnelles sont données pour le mâle, la femelle, la larve, le fourreau et le développement de l'espèce, qui est comparée avec les autres espèces du genre.

## Introduction

Today the genus *Sciopetris* Meyrick, 1891 incorporates six species: the type species *M. technica* Meyrick, 1891 described from Algeria, *M. amseli* Sieder, 1959 from Afghanistan, *M. melitensis* Rebel, 1919 from Malta, *M. pretiosa* (Stainton, 1872) from Morocco, *M. hartigi* Sieder, 1976 from Sardinia and *M. karsholti* Hättenschwiler, 1996 from Tunisia. All are small species and mostly insufficiently known. For most of the species only the male is known while female, larva, bag, and life history remain undescribed. The bag and life history are known only for *S. hartigi*. Several species are only known from a very limited area as are the islands of Sardinia and Malta. The description of the genus *Sciopetris* is based on three males that were collected by Meyrick "from sheltered rock-faces in Algeria". The genus and its type species *M. technica* are described very briefly:

"Head rough-haired; ocelli present; tongue absent. Antennae two-thirds, in males filiform, clothed with rather long pubescence (2), basal joint moderate, stout, with well developed pecten. Labial palpi rather short, porrected or drooping, with loose projecting hair-scales. Maxillary palpi obsolete. Posterior tibiae with appressed scales. Fore-wing with vein 1 furcate, 2 from two-thirds of cell, 7 absent, 10 absent, 11 from before middle of cell. Hind-wings under one, elongate-ovate, cilia 1; vein 3 remote from 4, 4 and 5 from a point or stalked, 6 and 7 parallel. (female probably apterous)."



**Fig. 1.** *S. melitensis* male. **a.** Malta, Bormla, 23.i.2006, Zerafa leg. (photo by M. Zerafa), **b.** antenna.

From this we can understand that there are eight veins from the discoidal cell on the forewing and six on the hindwing, that  $m_{2+3}$  are stalked, that ocelli are present, and that the antennae reach  $2/3$  of the wing-length and are filiform. The wing venation in several of the species is not constant and in some the ocelli are absent. The species also show variations in other identification criteria. In the descriptions of the various species, due to the limited number of specimens available, only a few of the identification criteria could be compared.

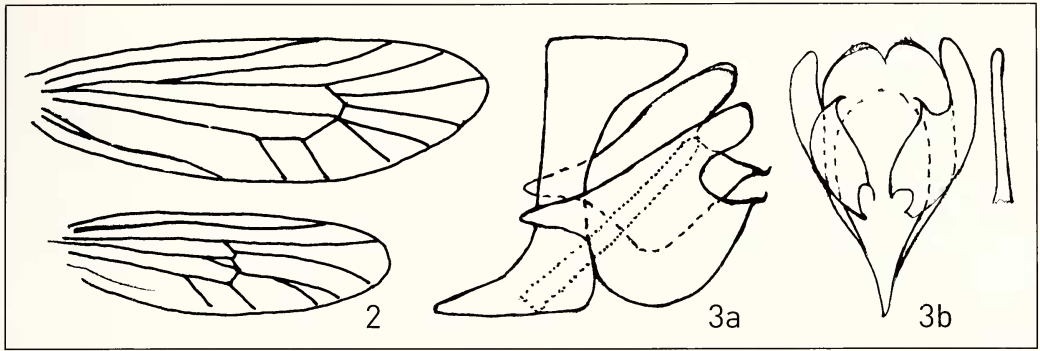
In this study we shall concentrate on *S. melitensis*, the species from Malta (Fig. 1a), knowing that also here there are differences between our findings on the one side and facts, assumptions, and descriptions in earlier studies on the other hand. However, we are convinced that the species we have at hand is identical with the single, damaged male Rebel described in 1919.

“A single male specimen, only partly in a good condition, of this very small new species was collected by Adolf Andres, a war prisoner on the Island of Malta. This probably happened in February 1915 and was mentioned (Andres 1916), already under the name suggested by me (i.l.)”. (This historical note was writ-

ten in the German language by Rebel).

*Sciopetris melitensis* species has been listed with little or no additional information by other authors in various Lepidoptera faunistic lists (Sieder 1959; De Lucca 1965: 514; Sammut 1984a: 65; 1984b: 10; 1985: 304; Sammut & Valletta 1989: 98; Sauter & Hättenschwiler 1999: 77). Recently Sammut (1989: 129; 2000: 42) translated to Maltese all the known information regarding this species. However, all these references regard the only two captures of *S. melitensis* known at that time. Since then many professional and amateur entomologists have been searching for this little species without success. It took over 50 years until one of us, Michael Zerafa, took two male specimens and found a 6–8 mm long bag that contained eggs. He took it home and after a few days, very small larvae were crawling out of the little bag and started to build a miniature bag of their own. He reared them successfully through the summer and in January and February of the next year adults, males and females, were hatching out of the bags and were mating and laying their eggs. From these eggs more specimens were reared by us and the life history could be observed and the species was studied. In the following lines we give a better and more complete description of the male, female, egg, larva, pupa, bag, and life history.

The genus *Sciopetris* belongs to the Taleporiini Tutt, 1900 (Psychidae: Taleporiinae). Taleporiini can be recognized by the short epiphysis and 6 veins from discoidal cell in hindwing. Characteristics for *Sciopetris* are: (1) forewing with 8 veins off the discoidal



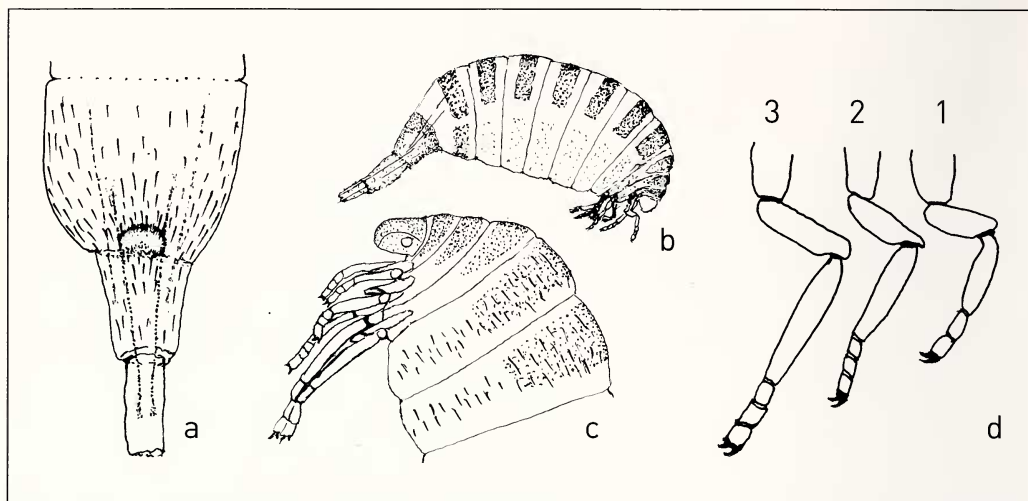
**Figs 2–3.** 2. Wing venation of male *S. melitensis*. 3. Male genitalia of *S. melitensis*, a. lateral view, b. ventral view.

cell and without accessory cell; (2) males with ocelli (but also present in *Bankesia*, *Pseudobankesia*, *Taleporia*); (3) antenna with an antero-ventral half-circle of bristles (Fig. 1b) (Sauter & Hättenschwiler 1999).

### Redescription of *Sciopetris melitensis* Rebel, 1919 from Malta

**Material.** The following description is based on 21 males, 9 females, 6 larvae, some of which were mounted on slides, and approximately 50 bags, all from the same location: Malta, Bormla, leg. M. Zerafa, reared ex. ova, or males collected in the field. One bag was collected at Manikata, also by Zerafa, and from it the parasite emerged. The specimens are deposited in the collections of the authors.

**Description.** Male. Wings narrow and long. Average wingspan 9.6 mm ( $n = 21$ ; smallest 8.2 mm, largest 11.2 mm; wingspan of *S. hartigi* and *S. amseli* 11 mm, *S. technica*: 10–11 mm). Bred specimens are on an average slightly smaller than wild collected males. Forewing with 8 veins off the discoidal cell, without accessory cell (Fig. 2). Colour whitish with brown scales forming variable dots and small brown areas (Fig. 1a). Hindwing with 6 veins off the cell, with an intercalated cell, veins  $m_2+m_3$  stalked, no connection between radial ramus and sub-costal (the original description gives incomplete data on the wings due to the strong damage on the holotype; Sieder 1959 also did not remove the wing scales of the only available specimen when describing *S. amseli* and therefore the actual venation of this species remains unknown; Hättenschwiler 1996 studied and published the wing venation of *S. karsholti*, and it differs in some aspects from that of *S. melitensis*). Scales of forewings wide, class 4–5 (Sauter 1956), on hindwings class 1–3, whitish in colour. Head without ocelli. Labial palps with 3 segments, bent forward. Antenna long,  $\frac{2}{3}$  to  $\frac{3}{4}$  of wing length, the 27–36 segments with scattered ventral bristles which stand at base of segments nearer together and forming kind of a ventral half-ring (Fig. 1b). Scapus and 3–4 basal segments coated with whitish scales. Eyes round and large; distance between eyes nearly twice that of eye diameter. Head and body covered with long whitish hairs. Forelegs with epiphysis; midlegs with one pair and hindlegs with two pairs of tibial spurs. Male genitalia (Fig. 3): saccus triangular. Valva about as long as tegumen. Sacculus with pointed thorn. Phallus long, straight.



**Fig. 4.** Female of *S. melitensis*, **a.** genitalia in ventral view, **b.** side view, **c.** enlarged head part, **d.** 1 foreleg, 2 midleg, 3 hindleg enlarged.

**Female** (Fig. 4). Wingless, 3–4 mm long (excluding ovipositor), and about 1.5 mm in diameter, cylindrical. Head and thoracic segments dorsally and laterally sclerotized, dark brown. Head small, eyes miniature, antenna reduced. Legs long, tarsi mostly with 4 segments, first about as long as 2–4 together (Fig. 4d); some specimens only have three tarsal segments, 2 short and 1 long. Abdominal segments 1–7 whitish to pale yellow, with light brown dorsal plates (Fig. 4b). Segment 8 with full circle of golden abdominal hair tuft; genital opening ventral, between segments 8 and 9 (Fig. 4a); ovipositor telescopic.

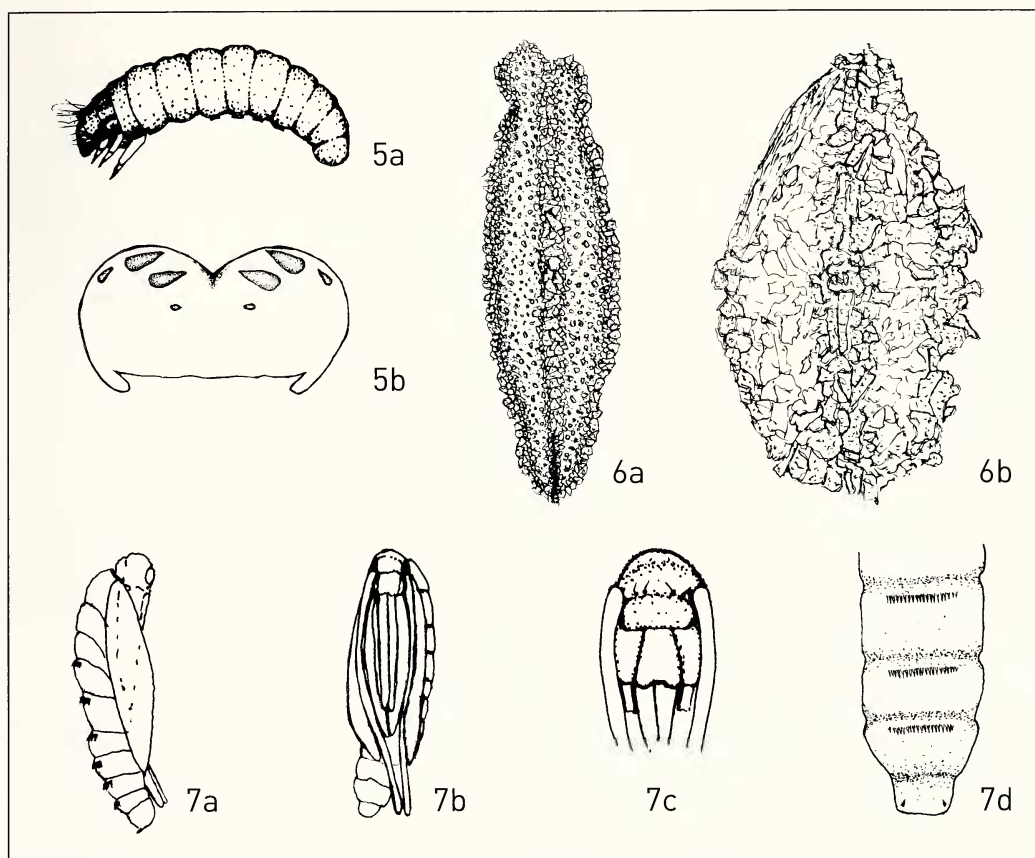
**Egg**. Yellowish when fresh, slightly oval, 0.35–0.45 mm long, without any markings or sculpture. The colour changes with the life history of the larva to dark grey. In two of the bags opened we counted 65 and 71 eggs respectively. The body of one dead female contained 49 fully developed eggs.

**Larva** (Fig. 5a). Whitish to pale yellow; head dark; thoracic segments 1–3 with dark brown markings and stripes; length 3.5–4.5 mm, diameter approx. 1 mm. (Fig. 5b). Ventral side of labrum with four pairs of setae. Tineidae have 3 pairs only (Davis 1978).

**Bag** (Figs 6a–b). Triangular in cross section. Female bags range from 6.6–8.2 mm in length and male bags from 5.3–6.8 mm. About 2 mm wide. Opening of female bags decorated with debris of dried leaves and lichens. Silk structure with coating of sand and miniature stones; often partly, or even completely covered with organic matter like bits of plant and wood tissue and also minute parts of dead insects.

**Pupa** (Fig. 7). Male pupa 3–4 mm long, 0.8–1.2 mm in diameter. Sclerotized exuvia very delicate and fragile; light brown skeleton thinner than in other genera of Taleporiini. Abdominal segments (Fig. 7a) equipped with row of thorns facing backwards on each segment anteriorly. Sheaths of appendices arranged as usual; long antennal sheaths reaching rear end of pupa. Thorax-head plate (Fig. 7c) with two pairs of bristles.





**Figs 5–7. *Sciopetris melitensis*.** 5. Larva, **a.** lateral view, **b.** ventral side of labrum with 4 pairs of setae. 6. Bags, **a.** bag with only silk and sand, **b.** bag, upper side completely covered with plant material, only the ventral side showing the silken basic construction. 7. Male pupa after hatching, **a.** lateral view, **b.** ventral view, **c.** details of thorax-head plate, and **d.** abdomen with dorsal rows of thorns facing backwards, apical two thorns facing forward.

Female exuvia even thinner than in male; reduced to soft skin which is pushed backwards rather than being crawled out of. After hatching, exuvia remaining as flat package in bottom of bag.

**Life history.** *Larva.* The young larvae hatch from after 2–4 weeks in their mother's bag and hurry to get out. Their first action is to build a miniature bag with silk and often with minute plant material taken from the mother's bag or elsewhere. During their whole life the larvae maintain, repair, and enlarge their bag to accommodate their increasing size, but they never leave it. The bag is kept long enough and wide enough so that the larva can turn around within it. To enlarge the bag, the larva bites it open along one of the three selvages and inserts a small section of silk and also little bits of foreign matter. This procedure is done along one selva after the other until the inside room is again wide enough for the grown larva to turn around inside the bag. The larvae mainly feed on the moss *Tortula muralis* Hedwig, 1801, but we observed also that dead insects, found on the moss, are eaten.

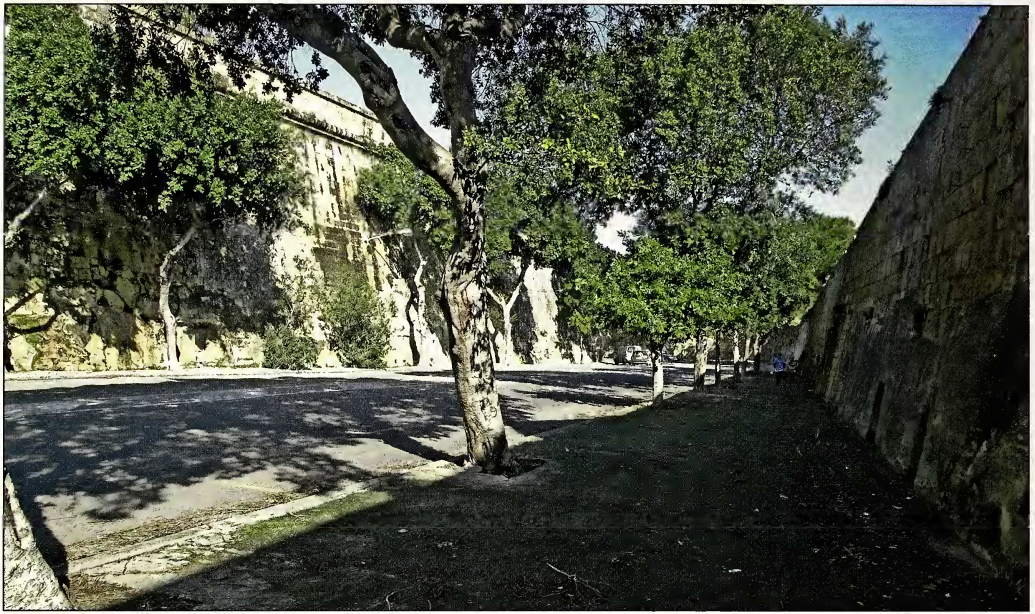


Fig. 8. Biotope: a shady street with moss covered rocks and walls (photo by P. Sammut).

During the warm and dry summer a diapause is observed for some 2–3 months. In autumn this diapause ends and the larvae eat again for some weeks and prepare for pupation. For most of the time the larvae hide in the moss, where many also pupate.

**Pupa.** The dorsal abdominal thorns would help the pupa to work itself out of the bag by bending the abdomen up and down and finding hold in the wall of the bag. This behavior is normal with both sexes in all genera of the Naryciinae and Taleporiinae. However, according to our observations *S. melitensis* does not partly work the pupa out of the bag prior to hatching and the rows of thorns on the pupae can be interpreted as a relict (Fig. 7a, d). The two thorns on the last segment facing forward probably help the pupa in preventing it from falling out of the bag when preparing for hatching.

**Adult.** Mating occurs early in the morning. The female hatches at dawn and waits outside of her bag with the ovipositor widely extended, calling for a partner with her pheromone. The male hatches at dusk and dries its wings. It remains on or near the bag until the next morning. When the pheromone of a female reaches the male it follows the scent against the airflow to find the waiting female. Mating lasts only a few minutes. Immediately after, the female starts laying about 50–70 eggs into the bag beside the pupal exuvia and rubs off her abdominal hairs to place them between the eggs for cushioning and insulation. When finished, the female “walks” away and dies. The sex ratio is balanced. The species has one generation per year which begins approximately with egg laying in January or February, and lasts a full year with a diapause of 2 to 3 months in the summer.

**Parasites.** The only parasitoid known emerged from a bag collected in Manikata. It was a male wasp of the genus *Gelis* Thunberg, 1827 (Ichneumonidae, Cryptinae). The biomass of the larva is practically identical with that of the wasp.





Fig. 8. Biotope; a shady street with moss covered rocks and walls (photo by P. Sammut).

**Habitat** (Figs 8–9). This species is known only from Malta, and it is the only *Sciopeteris* known on the Maltese archipelago, where it was found on mossy rocks and stone walls colonized mostly by *Tortula muralis* Hedwig, 1801 (Pottiaceae). Besides the type locality, it is also known from Gharghur (Amsel 1953) and Manikata. The situation of the collecting localities is shown on the map (Fig. 10).

**Etymology:** The name *melitensis*, meaning “Maltese” or “of Malta” is derived from the old name of the Island of Malta – Melita.

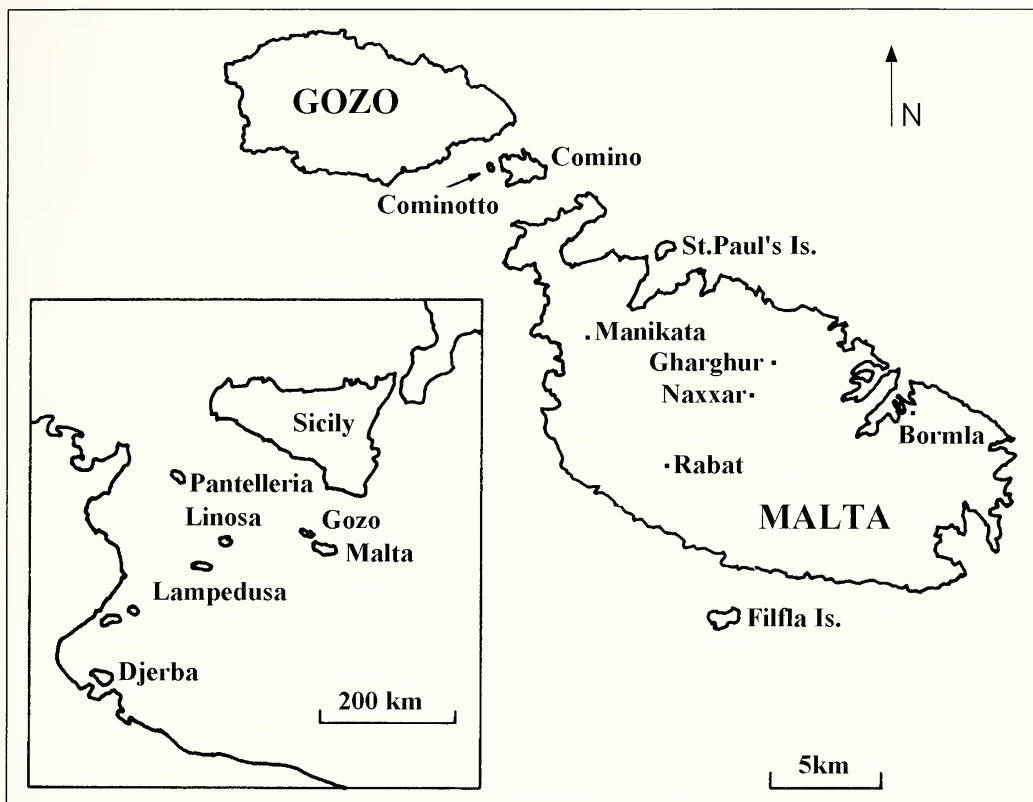
## Discussion

With the exception of *S. melitensis*, from none of the other five species in the genus are all stages known and many identification criteria remain unknown. In the following table the published data are compiled. One can observe important criteria, such as the presence or absence of ocelli and the presence or absence of an intercalated cell in the hindwing. Such important criteria often serve to separate genera, but in the case of the genus *Sciopetrus*, too many questions remain unanswered. For this reason we do not split the genus and accept it in its present, heterogeneous state until more is known of the species in question. In fact, the species *S. melitensis*, re-described in this paper, differs from the general description of the genus by the absence of ocelli and the presence of an intercalated cell in the hindwing. However, we are convinced that the species reviewed here is the species found by Adolf Andres in 1915 and partly described by Rebel in 1919.

Tab. 1. Summary of known data for all *Sciopetris* species. Blank areas indicate "unknown".

	<i>technica</i> Meyrick, 1891	<i>amseli</i> Sieder, 1959	<i>melitensis</i> Rebel, 1919	<i>pretiosa</i> (Stainton, 1872)	<i>hartigi</i> Sieder, 1976	<i>karsholti</i> Hättenschwiler, 1996
source of info	original description	original description	actual studies	original description	original description, study of paratype (*)	original description
number of males known	3	1	21	1	5	25
flying season	April	May	January–February	April	February–March	May
type locality	Algeria, Philippeville	Afghanistan, Kashka, 1800 m	Malta, near sea level	Morocco, Marshen	Sardinia	Tunisia, 35 km off sea coast
wingspan (mm)	10–11	11	8.2–11.2	5 lines = 10.6	11	9.5–10
forewing veins off discoidal cell	8		8		8	8
forewing scales (Sauter 1956)		5	4–5		4	4–5
hindwing veins off discoidal cell	6, m2+m3 often stalked		6, with intercalated cell m2+m3 stalked		6	5, with intercalated cell
hindwing scales (Sauter 1956)	hair scales	narrower than on forewing	1–3		„hairlike“ 1–2	2–3
ocelli	present		missing		present (*)	missing
antenna segments		28	27–36		approx. 35	29
eyes distance : eye height			2 x		approx. 2 x (*)	1.2–1.5 x
epiphysis on foreleg		missing	present		present	present
phallus		short, curved	thin, long, straight		short, curved	long, nearly straight
female size (mm)			length 3–4 diameter 1.5		length 2.5 diameter 1.5	
bag length (mm)			triangular; male 5.3–6.8; female 6.5–8		triangular; 7–8 (*)	





**Fig. 10.** Map with the collecting localities of *S. melitensis* on the island Malta and position of the Maltese Archipelago in the Mediterranean Sea.

## Acknowledgements

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